

I CLAIM:

1. A threaded union, comprising:

first and second subcomponents that are interconnected by a nut, the first and second subcomponents having respective mating ends with complementary ring gasket grooves therein; and

a metal ring gasket received in the complementary ring gasket grooves, the metal ring gasket providing a high-pressure seal between the mating ends of the first and second subcomponents when securely interconnected by the nut.
2. The threaded union as claimed in claim 1 wherein the nut is a wing nut that is hammer-torqued.
3. The threaded union as claimed in claim 1 wherein the nut is a spanner nut that is torqued using a wrench.
4. A threaded union for providing a high-pressure, fluid-tight, metal-to-metal seal in a fluid conduit, comprising:

a first subcomponent comprising a generally annular body that includes a first mating end with pin threads;

a threaded nut having an annular top wall and box threads for engaging the pin threads on the mating end of the first subcomponent;

a second subcomponent comprising a generally annular body that includes a second mating end with a radial flange against which the annular top wall of the threaded nut abuts so that the first and

second mating ends are forced together when the box threads of the threaded nut engage the pin threads of the first subcomponent; and

a metal ring gasket compressed between the first subcomponent and the second subcomponent to form a high-pressure, fluid-tight, metal-to-metal seal between the first subcomponent and the second subcomponent.

5. The threaded union as claimed in claim 4 wherein the metal ring gasket is compressed between the mating ends of the first and second subcomponents.
6. The threaded union as claimed in claim 5 wherein the metal ring gasket is seated in an annular groove in the mating end of the first subcomponent.
7. The threaded union as claimed in claim 6 wherein the annular groove has beveled sides.
8. The threaded union as claimed in claim 7 wherein the annular groove is beveled to an angle of 20 to 26 degrees from the vertical.
9. The threaded union as claimed in claim 8 wherein the annular groove is beveled to an angle of 23 degrees from the vertical, plus or minus 1 degree.
10. The threaded union as claimed in claim 9 wherein the second subcomponent has a beveled annular groove having a bevel angle equal to an upper bevel angle of the metal ring gasket.

11. The threaded union as claimed in claim 4 wherein the threaded nut is a wing nut that includes hammer lugs to permit the threaded nut to be tightened using a hammer.
12. The threaded union as claimed in claim 4 wherein the threaded nut is a spanner nut that is tightened using a wrench.
13. The threaded union as claimed in claim 4 wherein the first subcomponent is a wellhead and the second subcomponent is a drilling flange.
14. The threaded union as claimed in claim 4 wherein the first subcomponent is a wellhead and the second subcomponent is a casing mandrel.
15. The threaded union as claimed in claim 4 wherein the metal ring gasket is made of steel.
16. The threaded union as claimed in claim 15 wherein the metal ring gasket is made of plain carbon steel with a carbon content ranging from 0.14% to 0.20%.
17. The threaded union as claimed in claim 16 wherein the metal ring gasket is made of AISI 1018 nickel-plated steel.
18. The threaded union as claimed in claim 16 wherein the metal ring gasket is made of stainless steel for use in sour service wells.

19. The threaded union as claimed in claim 18 wherein the stainless steel is one of AISI 316 stainless steel and AISI 304 stainless steel.
20. A metal ring gasket for use as a seal in a threaded union, the metal ring gasket comprising a generally annular body having a substantially flat top surface and a substantially flat bottom surface for being deformably compressed between first and second subcomponents of the threaded union.
21. The metal ring gasket as claimed in claim 20 wherein the metal ring gasket is made of a metal having a ductility which exhibits at least 40% reduction in cross-sectional area at a fracture load.
22. The metal ring gasket as claimed in claim 20 wherein the metal ring gasket is made of a metal having a ductility which exhibits at least 50% reduction in cross-sectional area at a fracture load.
23. The metal ring gasket as claimed in claim 20 wherein corners of the annular body are beveled and the annular body has an octagonal cross-section.
24. The metal ring gasket as claimed in claim 20 wherein the metal ring gasket is made of plain carbon steel.
25. The metal ring gasket as claimed in claim 24 wherein the plain carbon steel is AISI 1018 nickel-plated steel.
26. The metal ring gasket as claimed in claim 20 wherein the metal ring gasket is made of stainless steel.

27. The metal ring gasket as claimed in claim 26 wherein the stainless steel is selected from the group consisting of AISI 316 stainless steel and AISI 304 stainless steel.
28. A method of providing a fluid seal between first and second components of a threaded union, the method comprising:

seating a metal ring gasket in an annular groove in mating surfaces of the first and second subcomponents of the threaded union; and

securing the first and second subcomponents together using a threaded nut by tightening the threaded nut, wherein a high-pressure, fluid-tight seal between the first and second subcomponents is achieved by compressing the metal ring gasket between the mating surfaces of the first and second subcomponents.
29. The method as claimed in claim 28 wherein the step of securing the second subcomponent to the first subcomponent by tightening the threaded nut comprises hammering lugs on the threaded nut.
30. The method as claimed in claim 28 wherein the step of securing the second subcomponent to the first subcomponent by tightening the threaded nut comprises using a spanner wrench to tighten the threaded nut.
31. The method as claimed in claim 28 wherein the step of using the spanner wrench comprises using a torque wrench to tighten the threaded nut to a predetermined torque.